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FLOOD INSURANCE STUDY



CITY OF ST. MARY,
MISSOURI
STE. GENEVIEVE COUNTY



REVISED:

AUGUST 16, 1988

COMPLETED

Federal Emergency Management Agency

COMMUNITY NUMBER - 290326

ORIGINAL

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**NOTICE TO
FLOOD INSURANCE STUDY USERS**

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of St. Marys, Sainte Genevieve County, Missouri, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert St. Marys to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

Letters were sent to the State Flood Insurance Coordinating Agency, the regional offices of the Department of Housing and Urban Development, the Soil Conservation Service, and the U.S. Geological Survey informing them about the start of this study and requesting that any previously published information pertinent to the study be sent. A final coordination meeting was held on December 16, 1975, with the U. S. Army Corps of Engineers, Federal Insurance Administration and city officials. No controversies concerning the study arose from this meeting.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, St. Louis District, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 12. This work, which was completed in November 1975, covered all flooding sources affecting the City of St. Marys, Missouri.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of St. Marys, Missouri. The area of study is shown on the Vicinity Map (Figure 1). The old channel of the Mississippi River forms the eastern border of the city. Tributaries flowing through the city and into the old channel of the Mississippi River are the St. Laurent and Walnut Creeks, both of which originate outside of the city. St. Laurent Creek bounds the city on the south and Walnut Creek bisects the northern portion of the city. Kaskaskia Island is located east of St. Marys and is separated from the city by the old channel of the Mississippi River. This study considers conditions that will result from a proposed raise of the flood control levee around Kaskaskia Island (Reference 1). Because this levee increase will affect the flood hazard of the area, it was considered in the flood hazard determinations. The areas studied in detail were chosen with consideration given to all forecasted development and proposed construction for the next 5 years (through June 1981).

2.2 Community Description

The City of St. Marys, Missouri, is located in the southeastern portion of Ste. Genevieve County, Missouri 9 miles south of Ste. Genevieve and 45 miles northwest of Cape Girardeau.

The present day community dates back to a late 1800 Mississippi River settlement, referred to as Sainte Maries Landing. The towns early economic livelihood was largely related to mineral extraction.

St. Marys became physically separated from the western Mississippi River bank with the flood of 1881. The damaging waters, which carved a new channel seven miles further east of St. Marys, left the Illinois town of Kaskaskia on the Missouri side of the Mississippi River. From the late 1850s to the present, St. Marys has remained largely unchanged. The railroad and area highways have both replaced the Mississippi River as the major transportation method for local products.

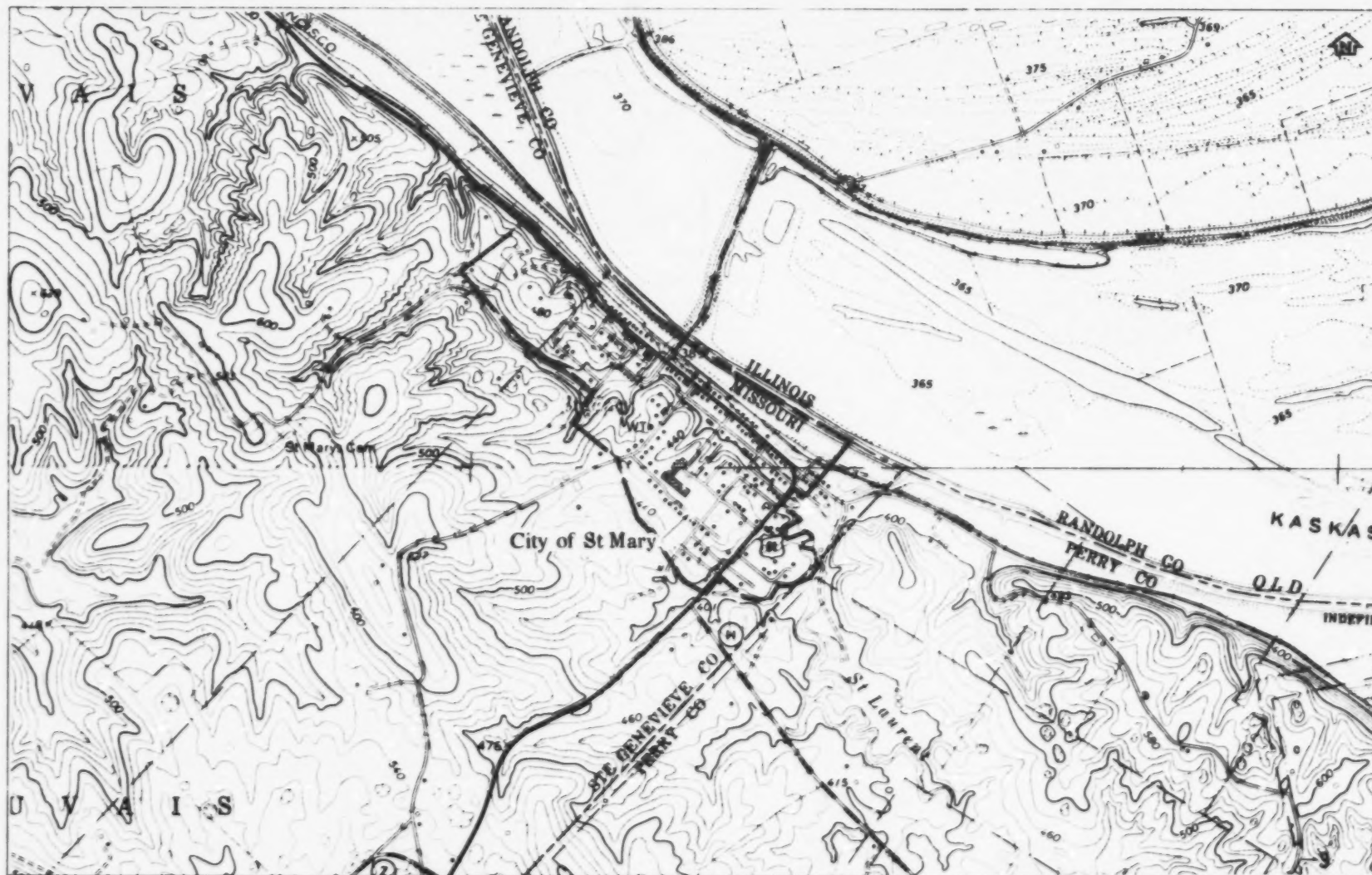
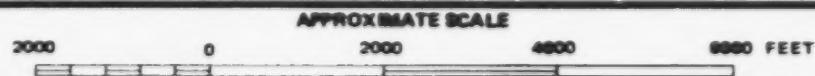


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)



VICINITY MAP

The majority of commercial, industrial, and residential buildings, and public facilities are situated in the low-lying flood plain, with some residences situated on higher flood plain elevations. The city contains approximately 270 acres, 80 of which are within the 100-year flood plain.

According to the U. S. Department of Commerce, Bureau of the Census, St. Marys had a 1970 population of 645, which represented a 2 percent growth over the 1960 population (Reference 2). Population projections for St. Marys, developed by the Southeast Missouri Regional Planning Commission in 1974, indicated a 1980 growth rate of between 2 and 14 percent and a 1990 growth rate of between 7 and 19 percent (Reference 3).

Although the U. S. Weather Bureau does not maintain records for the immediate area of St. Marys, such data are given in U. S. Weather Bureau publications for St. Louis, Missouri and Cairo, Illinois. The mean annual temperature is 56.3°F at St. Louis and 58.5°F at Cairo. The highest recorded temperatures at the two stations have been 110°F at St. Louis and 106°F at Cairo. The lowest recorded temperatures have been -22°F at St. Louis and -16°F in Cairo. The normal growing season between frosts amounts to 208 days at St. Louis, Missouri and 215 days at Cairo, Illinois. There are no official rainfall gages at St. Marys, but annual precipitation for the nearby community of Farmington, Missouri is approximately 42 inches.

Urban vegetation within the city limits is generally limited to shade trees, small shrubs, and private lawns. Trees in the low-lying flood plain area are generally limited to willow, cottonwood, and silver maple (Reference 4).

2.3 Principal Flood Problems

St. Marys is subject to flooding from the Mississippi River at a stage of approximately 35 feet on the Chester gage. The city has been subject to several damaging floods in recent decades, the most significant floods being those of 1947 (crest stage of 38.2 feet), 1951 (crest stage of 39.3 feet), and 1973 (crest stage of 43.3 feet). Within the city limits, Mississippi River backwater flows dominate over the flows of St. Laurent Creek, St. Laurent Branch, and Walnut Creek.

In the spring of 1973, the Mississippi River overflowed its banks and, as a result, numerous communities along the flood plain were inundated. This flood at St. Marys was one of the largest ever recorded, and resulted in significant damage. Numerous families were evacuated from low-lying areas, including nearby Kaskaskia Island. Emergency sandbagging operations, largely in the main street area, prevented additional damages. U. S. Highway 61, a major access route to the city, was under water in the flood plain areas and transportation was possible only by boat.

The Southeast Missouri Regional Planning Commission indicated that 25 to 30 residences and 8 to 10 businesses were flooded (Reference 5). Property damage alone was set at \$375,000. Refer to Figures 2 and 3 for scenes of the 1973 flood.

2.4 Flood Protection Measures

At present, the City of St. Marys lacks flood protection from either the Mississippi River or the three creeks which meander through the community.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect both current and planned conditions in the watersheds of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the city limits.



Figure 2. Spring 1973 Mississippi River Flood at City of St. Mary's Looking North With Kaskaskia Island Bridge on Right



Figure 3. Spring 1973 Mississippi River Flood, With Highway 61
in Background

Since there are no streamflow records for St. Laurent Creek, St. Laurent Branch, and Walnut Creek, peak discharges for floods of the 10-, 50-, and 100-year recurrence intervals were developed from a regional frequency analysis for streams within the area of the U. S. Army Corps of Engineers, St. Louis District (Reference 6). This frequency analysis was completed by the District in November 1974.

Discharges for the 500-year floods for St. Laurent Creek, St. Laurent Branch, and Walnut Creek were determined by straight line extrapolation of a log-probability graph of flood discharges for frequencies up to 100-years.

Discharge-drainage area curves were prepared from these data and are included in this report as Figure 4.

3.2 Hydraulic Analysis

The hydraulic characteristics of streams in the community were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.

Water-surface profiles, reaches, and flooded areas were determined by using the U. S. Army Corps of Engineers' HEC-2 computer program "Water Surface Profiles" (Reference 7). Field inspections of St. Laurent Creek, St. Laurent Branch, and Walnut Creek were made to determine the location of field cross sections and to estimate values of channel roughness for use in the study. Water-surface elevations for the Mississippi River were developed from the Mississippi Basin Model at Clinton, Mississippi.

Long term river gages at St. Louis, Missouri (period of records 1861-1974) and Chester, Illinois (period of record 1891-1974), were used to perform log-Pearson Type III statistical analyses for development of flow frequency curves. Using a computer program model, large hypothetical and record floods were analyzed to determine flood flows and without the reservoir controls. The updated frequency curves were then adjusted downward by the flow differences (because of the reservoirs) to represent present dry conditions.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	LOCATION ¹	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (M.S.L.)	WITHOUT FLOODWAY (M.S.L.)	DIFFERENCE (FT.)
ST. LAURENT CREEK							
A	1100	130	949.0	4.95	393 ²	393 ²	0.0
B	2170	60 ³	521.0	9.02	393 ²	393 ²	0.0
WALNUT CREEK							
A	400	80	1230.0	1.71	393 ²	393 ²	0.0
B	710	40	1694.0	1.24	393 ²	393 ²	0.0
C	1450	60	548.0	3.84	393 ²	393 ²	0.0

¹ FEET ABOVE MOUTH

² MISSISSIPPI RIVER BACKWATER CONTROLS

³ THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)

FLOODWAY DATA

ST. LAURENT CREEK - WALNUT CREEK

Flow valves from these adjusted frequency curves were then used in the physical Mississippi River Model to determine the Mississippi River profile for the 10- and 50-, 100- and 500-year frequency floods.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). All elevations are measured from mean sea level datum (msl). Elevation reference marks are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year flood have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000, with a contour interval of 10 feet (Reference 8). In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain

from flood plain development against the resulting increase in flood hazard. For the purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway prepared for this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for each stream studied (Table 1). As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway fringe and their significance to flood plain development are shown in Figure 5.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source affecting the City of St. Marys.

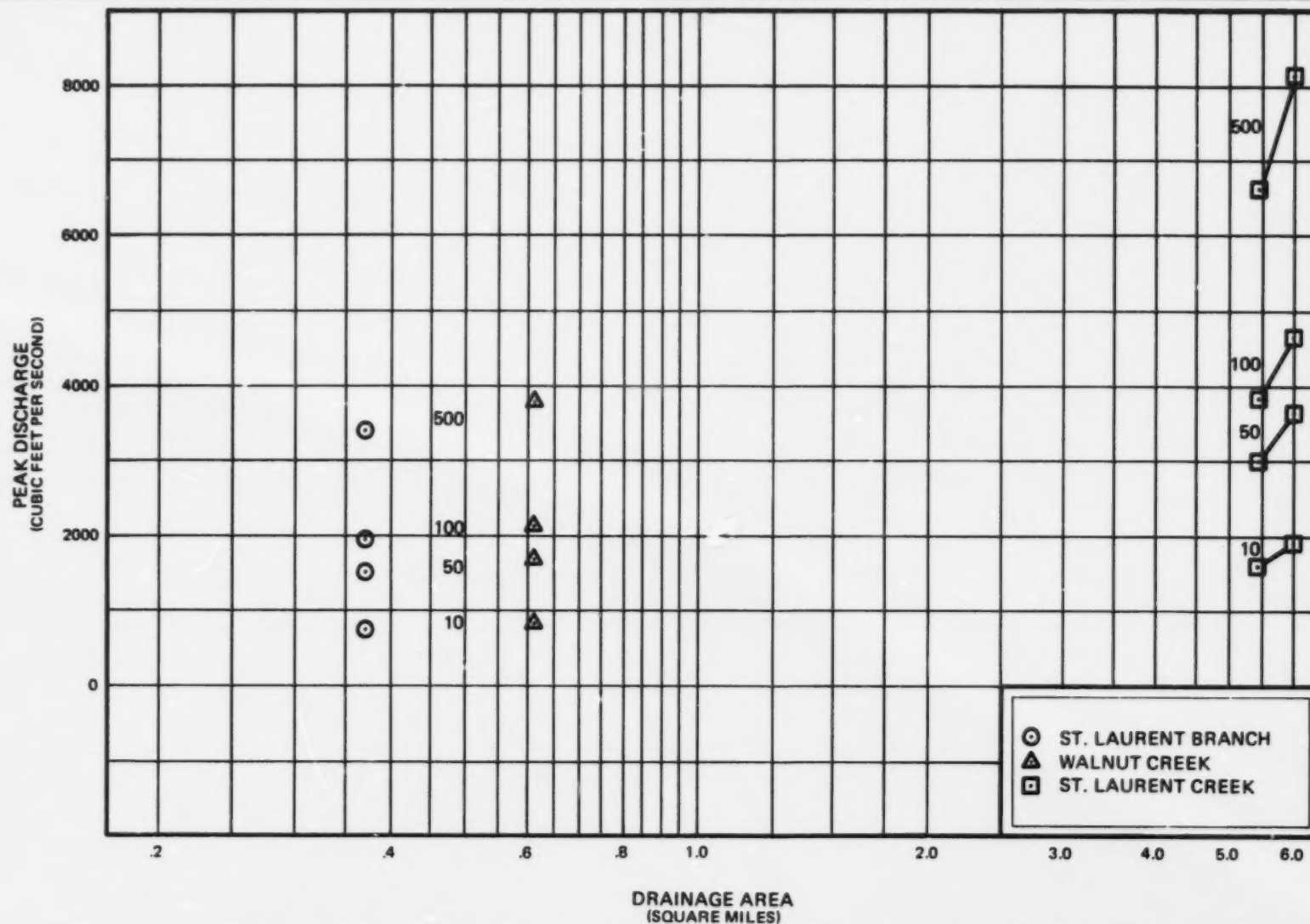


FIGURE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)

FREQUENCY DISCHARGE, DRAINAGE AREA CURVES

WALNUT CREEK - ST. LAURENT BRANCH - ST. LAURENT CREEK

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- Zone B: Areas between Zones A14, A15, and A21 and the limits of the 500-year flood.
- Zone C: Area not subject to flooding by the 500-year flood.

Table 2, "Flood Insurance Zone Data," summarizes the flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of St. Marys is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

6.0 OTHER STUDIES

The U. S. Army Corps of Engineers is presently undertaking several area flood control related studies. One study involves raising the existing Kaskaskia Island levee (adjacent to St. Marys, Missouri). A second study is related to interior flood control improvements for the existing Kaskaskia Island levee. A third study involves investigating flood control solutions to flood problems caused by nearby streams.

The present study is authoritative for purposes of the Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study are on file through 1981 at the home office of the U. S. Army Corps of Engineers, St. Louis District, 210 North 12th Street, St. Louis, Missouri 63101.

FLOODING SOURCE	PANEL ¹	ELEVATION DIFFERENCE ² BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION ³
		10% (10-YR)	2% (50-YR)	0.2% (500-YR)			
OLD MISSISSIPPI RIVER CHANNEL REACH 1	01	-10.7	-1.7	+1.9	110	A21	393
WALNUT CREEK REACH 1	01	-7.2	-1.7	+1.9	070	A14	393*
ST. LAURENT BRANCH REACH 1	01	-7.4	-1.7	+1.9	075	A15	393*
MISSISSIPPI RIVER BACKWATER	01	-10.7	-1.7	+1.9	110	A21	393*

¹ FLOOD INSURANCE RATE MAP PANEL

² WEIGHTED AVERAGE

³ ROUNDED TO NEAREST FOOT

*MISSISSIPPI RIVER BACKWATER CONTROLS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)

FLOOD INSURANCE ZONE DATA

OLD MISSISSIPPI RIVER CHANNEL - WALNUT CREEK -
ST. LAURENT BRANCH - MISSISSIPPI RIVER BACKWATER

8.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Army Corps of Engineers, St. Louis District, Mississippi River Between Ste. Genevieve and St. Marys, Missouri. House Document No. 519, 87th Congress, 2d Session, Washington, D. C., 1962
2. U. S. Bureau of Census, U. S. Census of Population: 1970 Number of Inhabitants. Final Report, 1971
3. -----, Regional Planning Commission Bulletin No. 13, Official Population Trends and Projections for the Southeast Missouri Region, Perryville, Missouri, 1974
4. Midwest Aquatic Enterprises, Biological Inventory of the Kaskaskia Island Project Area, Randolph County, Illinois, and Ste. Genevieve and Perry Counties, Mahomet, Illinois, 1975
5. Southeast Missouri Regional Planning Commission, Flood: The Mississippi River, 1973, Perryville, Missouri, 1974
6. U. S. Army Corps of Engineers, St. Louis District, Regional Frequency Analysis for Streams in the St. Louis District, St. Louis, Missouri, 1974
7. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, 1972
8. U. S. Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 feet: Kaskaskia and Kithium, Missouri

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at City Hall, St. Mary, Missouri.

9.1 First Revision (Revised August 16, 1988)

a. Acknowledgments

The floodway analysis for this Revisions Description was performed by the U.S. Army Corps of Engineers (COE), St. Louis District. The Federal Emergency Management Agency reviewed and accepted these data for purposes of this revision.

b. Scope

In this revision, a floodway was added to the Old Mississippi River Channel. The floodway was delineated by the COE using topographic maps at a scale of 1:24000 with a contour interval of 20 feet (Reference 9).

c. Floodways

Due to the scope of the previously effective Flood Insurance Study for this community, a floodway was not determined for certain flooding sources. This Revisions Description incorporates the results of the floodway analysis for the Old Mississippi River Channel into the effective Flood Insurance Study. The COE used engineering judgment in determining and delineating the floodway for the Old Mississippi River Channel since no separate hydraulic analysis was performed.

d. Insurance Application

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

The reach determinations, Flood Hazard Factors, and flood insurance zones presented in Sections 5.1, 5.2, and 5.3 of this report and Table 2, Flood Insurance Zone Data, are no longer applicable.

e. Flood Insurance Rate Map

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 9.1 d. and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents used the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

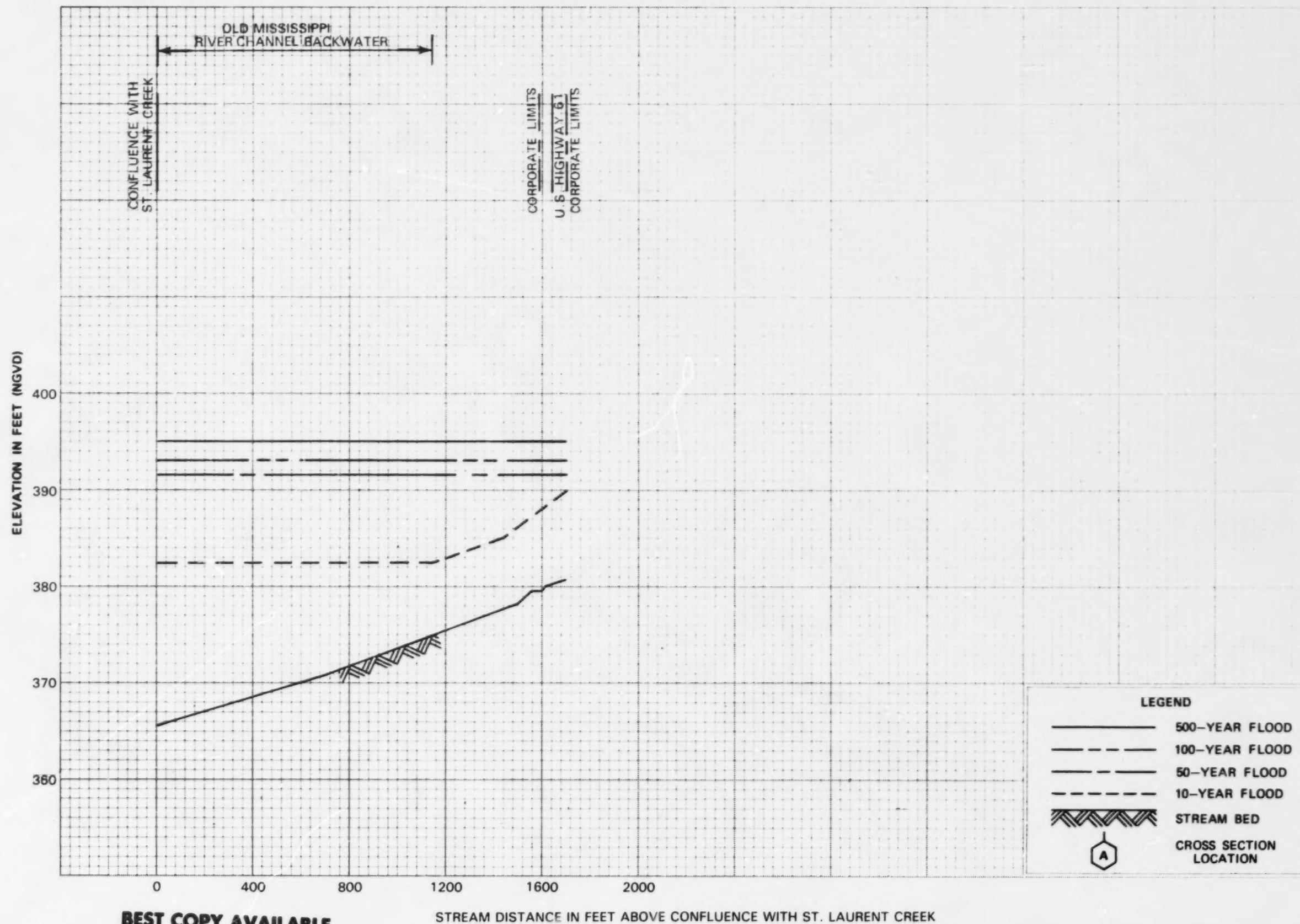
f. Other Studies

The Flood Insurance Study for Ste. Genevieve County, Missouri (Reference 10) is being revised and is in agreement with this revision.

g. References and Bibliography

9. U.S. Department of the Interior, Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 20 Feet: Lithium, Missouri-Illinois, 1970, photorevised 1982; Kaskaskia, Illinois-Missouri, 1970, photorevised 1982.

10. Federal Emergency Management Agency, Flood Insurance Study, Ste. Genevieve County, Unincorporated Areas, Missouri, April 1987, revision in progress.

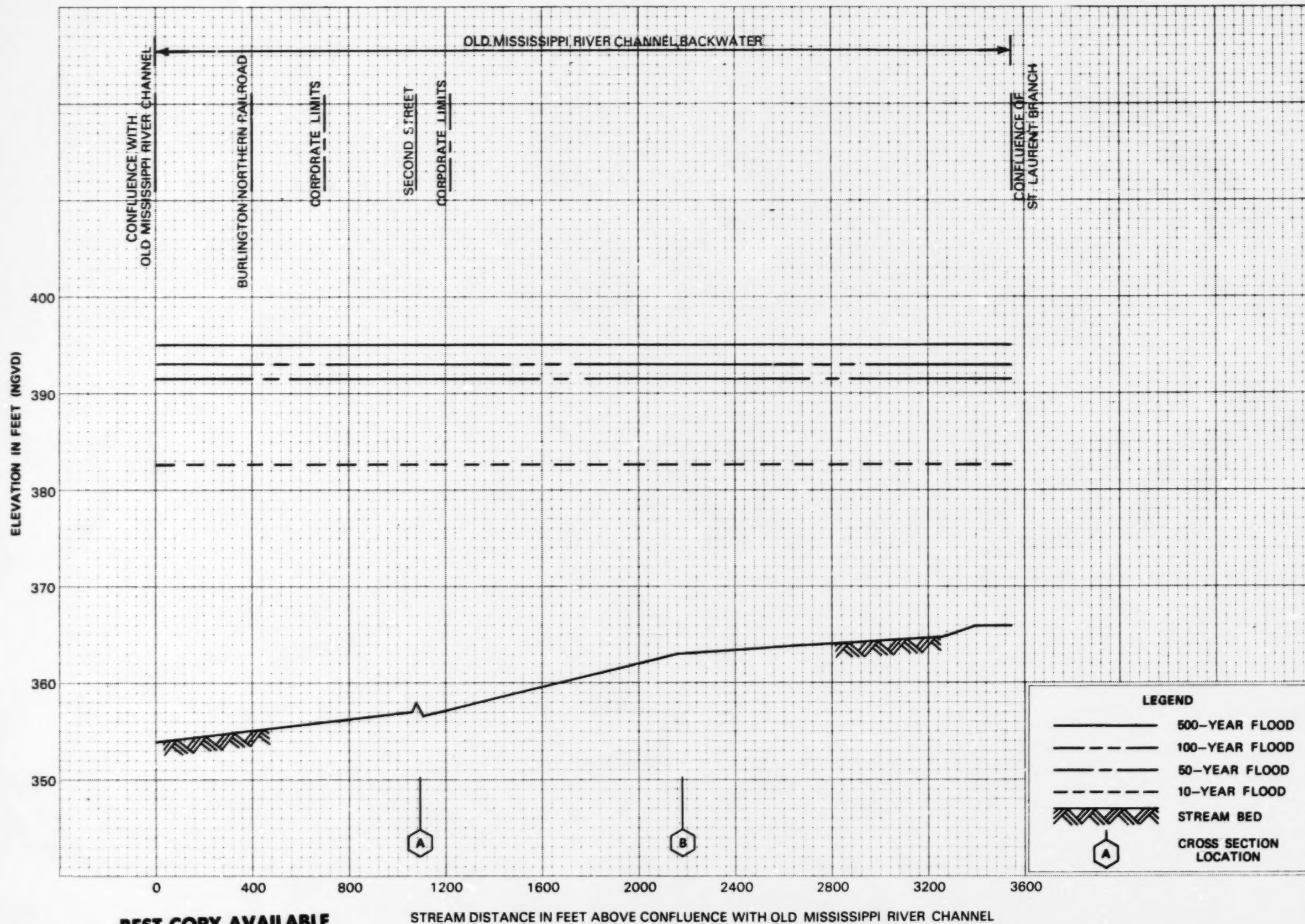


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FLOOD PROFILES
ST. LAURENT BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF ST. MARY, MO
(STE. GENEVIEVE CO.)

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FLOOD PROFILES

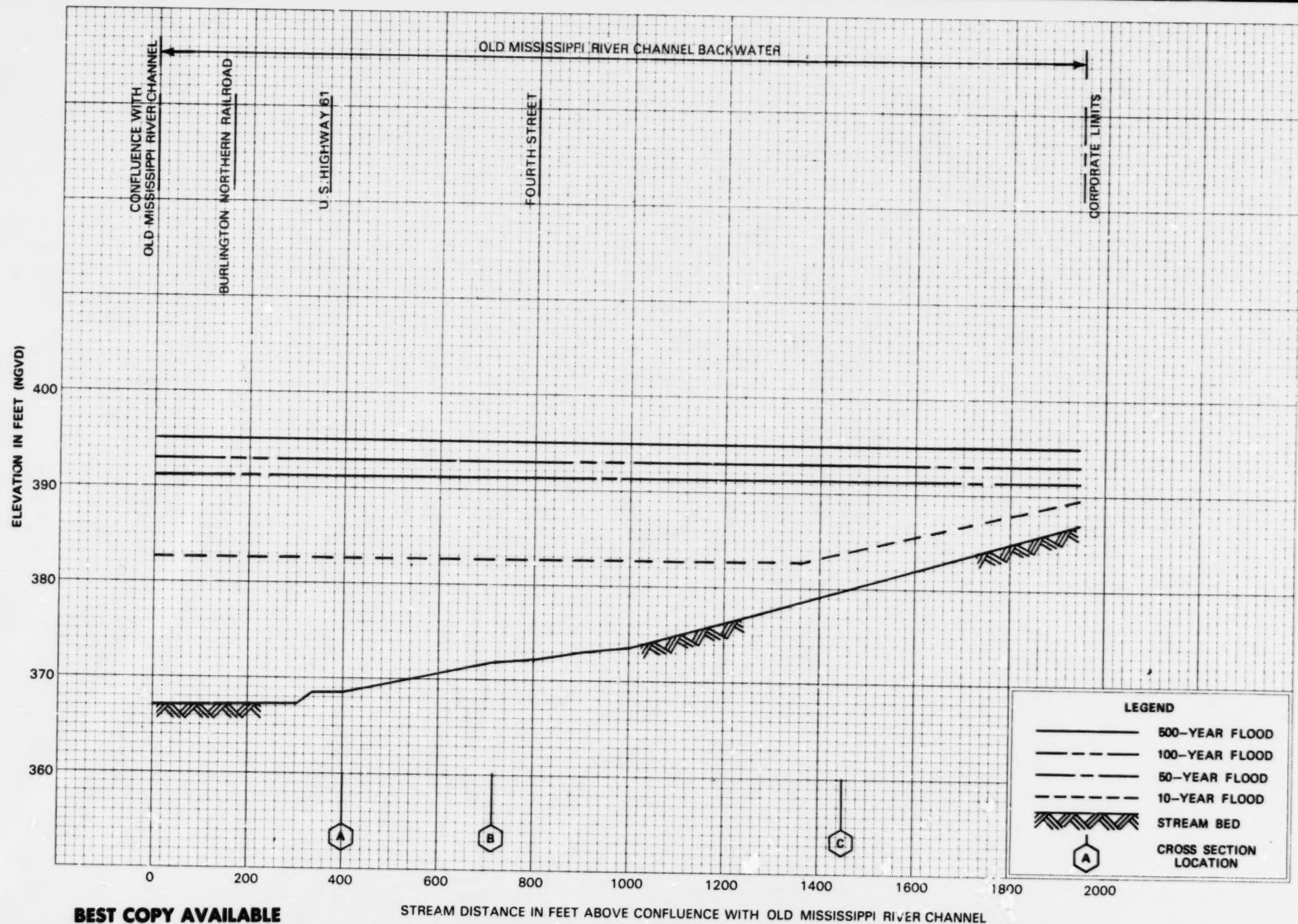
ST. LAURENT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)

02P



FLOOD PROFILES

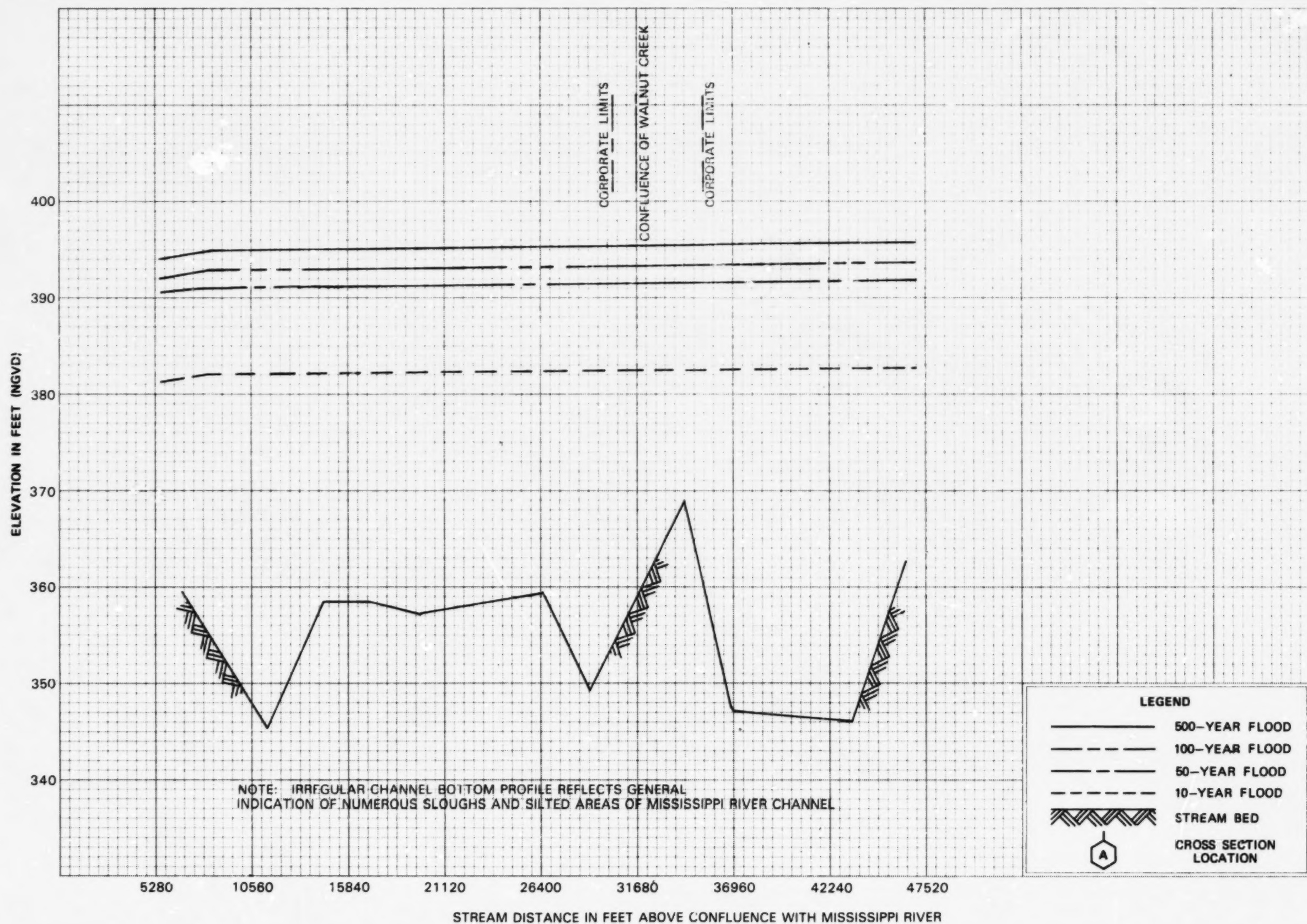
WALNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)

03P



FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF ST. MARY, MO

(STE. GENEVIEVE CO.)

FLOOD PROFILES

OLD MISSISSIPPI RIVER CHANNEL

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ELEVATION REFERENCE MARKS

REFERENCE MARK	PANEL	ELEVATION IN FT. (MSL)	DESCRIPTION OF LOCATION
RM 1	01	385.2	U.S.G.S. Bench Mark, 27 feet south of Hwy. No. 61 at south-west corner of concrete bridge, a chiseled square painted "U.E.". U.S.G.S. Nomenclature 34-0.4 U.E. 35 A 200 feet west of Bolt.
RM 2	01	382.6	Square chiseled on downstream right abutment of bridge, approximately 400 feet upstream of Hwy. No. 61 (bridge).
RM 3	01	378.2	+ cut on top of .75 inch Bolt at northwest corner of bridge abutment (St. Laurent Creek). Crossing 2nd Street bridge approximately 800 feet south of 90° turn in Hwy. No. 61.
RM 4*		395.1	Railroad spike 1.5 feet above ground in 30 inch sycamore, 170 feet north intersection of Hwys. H & 61, 30.5 feet west of Hwy. 61, 30 feet south of St. Laurent Branch.

*OUTSIDE CORPORATE LIMITS
U.S.G.S. DATUM IS 1929 MEAN SEA LEVEL

ELEVATION REFERENCE MARKS

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF ST. MARY, MO
(STE. GENEVIEVE CO.)

01E